CVCWA

Central Valley Clean Water Association

Representing Over Sixty Wastewater Agencies

STEVE HOGG – CHAIR, FRESNO	**ED CROUSE – VICE CHAIR, RANCHO MURIETA CSD**
JEFF WILLETT – SECRETARY, STOCKTON	**HUMBERTO MOLINA – TREASURER, MERCED**

August 9, 2010

Submitted Via U.S. Mail and Electronic Mail
Gayleen Perreira
Regional Water Quality Control Board,
Central Valley Region
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670
gperreira@waterboards.ca.gov

Re: **Comments on the Tentative Order for the City of Galt Wastewater Treatment Plant and Reclamation Facility**

Dear Ms. Perreira:

The Central Valley Clean Water Association (CVCWA) appreciates the opportunity to submit these comments on the tentative waste discharge requirements for the City of Galt (City), City of Galt Wastewater Treatment Plant and Reclamation Facility (Tentative Order). CVCWA is a non-profit organization that represents its members in regulatory matters that affect surface water discharge and land application with a perspective to balance environmental and economic interests consistent with applicable law. Accordingly, we provide the following comments related to the final effluent limitations for copper and Bis (2-ethylhexyl) phthalate (Bis-2) proposed in the Tentative Order.

The Tentative Order includes an average monthly effluent limitation of 3.1 micrograms per liter (ug/L) and maximum daily effluent limitation of 4.3 ug/L for copper. (Tentative Order at p. 12.) As explained in the hardness section of the Tentative Order's fact sheet, the concave

up/concave down approach[1] traditionally used to derive such limitations was not used in this case. (*Id*. at pp. F-20 to F-22.) Attachment 1 to this letter demonstrates that the proposed effluent limitations are overly stringent and the use of the concave up/concave down approach is technically sound and otherwise appropriate for the City's discharge. Therefore, we request that you revise the final effluent limitations for copper in accordance with the concave up/concave down approach.

        The Tentative Order also includes an average monthly effluent limitation of 1.8 ug/L and maximum daily effluent limitation of 3.6 ug/L for Bis-2. (Tentative Order at p. 12.) A single detection was the basis for the finding of reasonable potential for Bis-2 even though duplicate sample results were non-detect. Bis-2 is a common contaminant of sample containers, sampling apparatus and analytical equipment. The source of the Bis-2 value is likely plastics used for sampling or analytical equipment and thus not representative of the effluent or receiving water quality. Therefore, we ask that you exclude the suspect sample from the reasonable potential analysis, remove the effluent limitations for Bis-2 from the Tentative Order and revise the fact sheet accordingly. The State Water Resources Control Board approved this approach in its recent order regarding the City of Tracy's waste discharge requirements. (Order WQ 2009-0003 at pp. 17-18.)

        For these reasons, CVCWA respectfully requests that you revise the final effluent limitations for copper using the concave up/concave down approach and remove the final effluent limitations for Bis-2. If you have any questions or we can be of further assistance, please contact me at (530) 268-1338.

                                    Sincerely,

                                    Debbie Webster

                                    Debbie Webster
                                    Executive Officer

cc: Gregg Halladay, City of Galt
        Pamela Creedon, Central Valley Regional Water Quality Control Board

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[1] See Emerick, R.W., Borroum, Y., Pedri, J.E. 2006, California and National Toxics Rule Implementation and Development of Protective Hardness Based Metal Effluent Limitations, WEFTEC, Chicago, Ill.

Comments Regarding Tentative Order for City of Galt WWTP
Submitted by the Central Valley Clean Water Association
August 9, 2010

INTRODUCTION

The Tentative Order (TO) for the City of Galt wastewater treatment plant (WWTP) contains, among other items, an evaluation for hardness selection for use in CTR[1] hardness-based metals criteria. Metals with hardness-based criteria include: cadmium, copper, chromium III, lead, nickel, silver, and zinc. The TO correctly identifies the requirements for hardness selection in both the SIP[2] and the CTR of using reasonable worst case conditions and receiving water (ambient) hardness. Additionally, the TO highlights the considerable discretion available to the Central Valley Water Board in selecting hardness.

In the discussion of hardness selection, the curve method for hardness selection is discussed. The curve method compares how metals and hardness in the effluent and upstream receiving water mix to the criteria calculated from the mixed hardness. Criteria for chronic cadmium, chromium III, copper, nickel, and zinc have concave down shaped curves when plotted for a range of hardness. Acute cadmium, lead, and silver have concave up shaped curves when plotted for a range of hardness. The selection procedure of the appropriate hardness to calculate criteria for the effluent is different depending on whether the metal has a concave up or down criterion curve.

A 2006 Study[3] describes an evaluation of all discharge conditions of high to low receiving water flows, and whether the upstream ambient hardness is greater than or less than the effluent hardness. The 2006 Study considered upstream metals concentrations to equal the CTR criterion calculated at the upstream ambient hardness as the critical condition. At issue with the Galt TO is that upstream ambient copper and lead concentrations have been recorded exceeding the CTR criterion calculated from the paired upstream ambient hardness. The TO states that because the upstream ambient metals concentrations exceed the CTR criterion, the 2006 Study assumptions are violated negating the use of the curves method. The following is a demonstration that the curves method is the valid method to select hardness values to calculate effluent criteria even when the upstream ambient concentrations exceed the CTR criteria based on the upstream ambient hardness.

ECA FOR CONCAVE DOWN METALS

For concave down metals, when both the effluent and upstream ambient metal concentrations are at or below the CTR criteria calculated from the effluent and upstream hardness, respectively, any mixture of effluent and receiving water will always be in compliance with the CTR criteria. Given the entire receiving water is protected when effluent criteria are calculated using the effluent hardness, the appropriate choice for hardness selection is the receiving water hardness, equal to the effluent hardness, at the point of discharge. The concept behind the 2006 is presented as a

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[1] California Toxics Rule

[2] State Implementation Plan

[3] Emerick, R.W., Borroum, Y., Pedri, J.E. 2006, California and National Toxics Rule Implementation and Development of Protective Hardness Based Metal Effluent Limitations, WEFTEC, Chicago ,Ill.

schematic in Figure 1 for the case of upstream hardness less than effluent hardness. If the upstream ambient copper concentration is at the CTR criterion, there is no assimilative capacity as the water column is 100% of the CTR criterion. If the discharge is at the CTR criterion based on effluent hardness, then the receiving water at the end of pipe will equal the effluent hardness and metals concentration; and the receiving water will be at 100% of the CTR criterion. As the hardness and metals in the receiving water and effluent mix, the receiving water downstream of the discharge will be below the CTR criterion due to the concave down shape of the criteria curve.
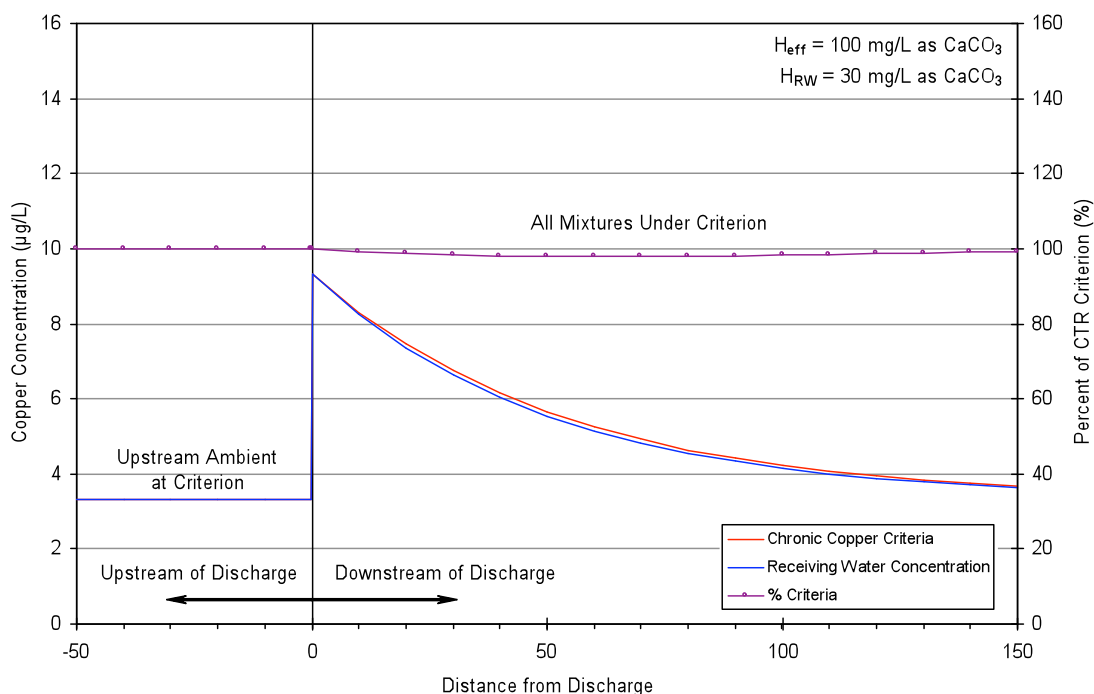
Figure 1: Schematic of Receiving Water with Discharge of Higher Hardness and Metals Criteria for a Concave Down Metal (Copper).

The schematic for the case of receiving water hardness greater than the effluent hardness is presented in Figure 2. The upstream ambient and at the point of discharge are at the CTR criterion and all mixtures of effluent and receiving water are below the CTR criterion.
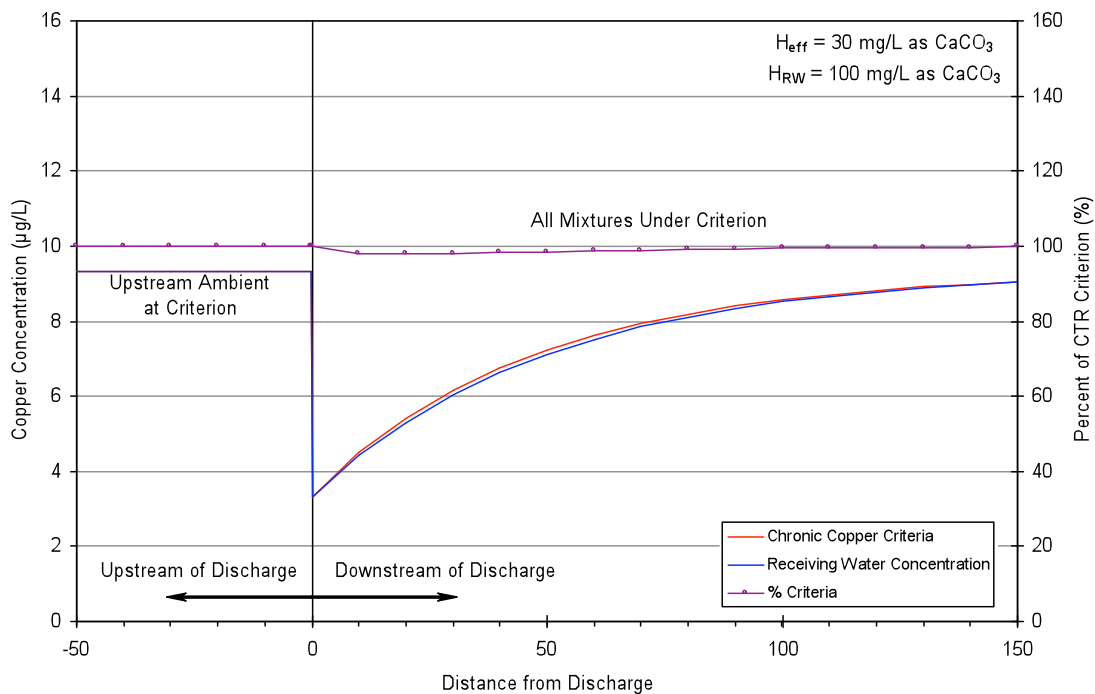
Figure 2: Schematic of Receiving Water with Discharge of Lower Hardness and Metals Criteria for a Concave Down Metal (Copper).

Using effluent hardness to calculate CTR criteria for concave down metals will always result in all mixtures of receiving water and effluent being below the CTR criterion if the upstream ambient is at or below the CTR criterion calculated from upstream ambient hardness.

For the condition where the upstream ambient metal concentration exceeds the CTR criterion based on upstream ambient hardness, similar schematics may be constructed. Figure 3 is a schematic of the condition where the upstream ambient hardness is less than the effluent hardness, the upstream ambient copper concentration is 140% of the CTR criterion, and the effluent concentration of copper is 0.0 μg/L. For the scenario displayed in Figure 3, the upstream receiving water is at 140% of the CTR criterion and right at the point of discharge the receiving water is at 0% of the CTR criterion due to the assumed 0.0 μg/L in the effluent. As the effluent and receiving water mix downstream of the discharge, the water quality is improved from the upstream condition. The clean effluent is diluting the upstream ambient. However, as the plume moves downstream with increased mixing and the percent effluent decreases, the copper concentrations increase as there is more upstream ambient represented in the water column. Depending on the flow ratios, the concentration in the receiving water downstream of the discharge may increase to be greater than the CTR criterion strictly due to the influence of the upstream ambient. For the case represented in Figure 3, the effluent is not causing or contributing to a receiving water exceedance of a water quality standard. All mixtures of effluent and receiving water have improved water quality over the upstream ambient, but the downstream mixtures may exceed CTR criterion solely due to the high level of metal in the upstream ambient.
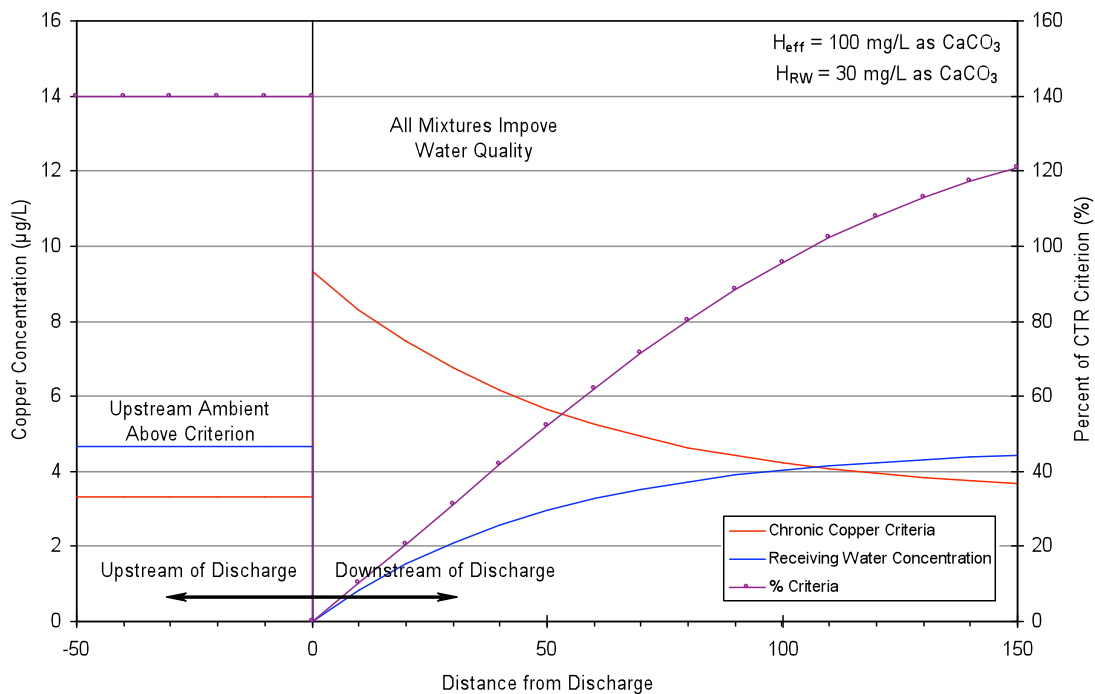
Figure 3: Schematic of Receiving Water with Discharge of Higher Hardness and Metals Criteria for a Concave Down Metal (Copper). Upstream Ambient Above CTR Criterion and Effluent at 0.0 μg/L.

A similar schematic may be constructed for the case of upstream ambient exceeding the CTR criterion with the effluent concentration equal to the CTR criterion calculated with the upstream ambient hardness level, as is presented in Figure 4. Upstream of the discharge the receiving water is assumed to exceed the CTR criterion calculated from the upstream ambient hardness. At the point of discharge the effluent is assumed to equal the CTR criterion based on the upstream ambient hardness. As with the case with no copper in the effluent, mixtures with sufficiently high ratio of upstream water exceed the CTR criteria solely due to the levels of metal in the upstream ambient. All mixtures of the effluent and receiving waters have improved water quality compared the upstream ambient. For the case of effluent metals concentration equal to the CTR criterion based on upstream ambient hardness levels, the effluent is not causing or contributing to a receiving water exceedance of a water quality standard.

A schematic of the condition where the upstream ambient copper exceeds the CTR criterion and the effluent copper concentration equals the CTR criterion based on the effluent hardness is presented in Figure 5. In the case represented in the Figure, the upstream ambient exceeds the CTR criterion and at the point of discharge the receiving water equals the CTR criterion. For all mixtures downstream of the discharge the water quality is improved compared to the upstream ambient. For the case of effluent metals concentration equaling the CTR criterion calculated with the effluent hardness, the effluent is not causing or contributing to a receiving water quality standard.

The case where the upstream ambient metal exceeds the CTR criterion and the effluent copper concentration equals the CTR criterion based on the effluent hardness and the upstream hardness is greater than the effluent hardness is presented in Figure 6. As with the case represented in Figure 5,

all mixtures of upstream ambient receiving water and effluent have improved water quality over the upstream ambient. The effluent is not causing or contributing to a receiving water quality standard.
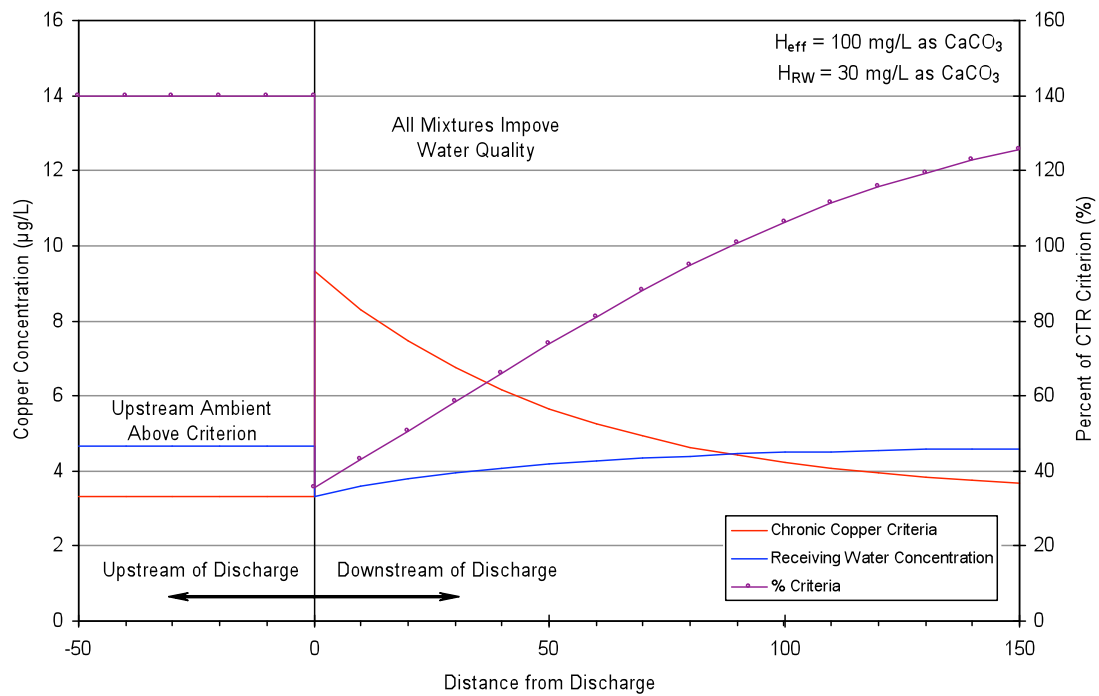

Figure 4: Schematic of Receiving Water with Discharge of Higher Hardness and Metals Criteria for a Concave Down Metal (Copper). Upstream Ambient Above CTR Criterion and Effluent CTR Criteria Calculated with Upstream Ambient Hardness Level.
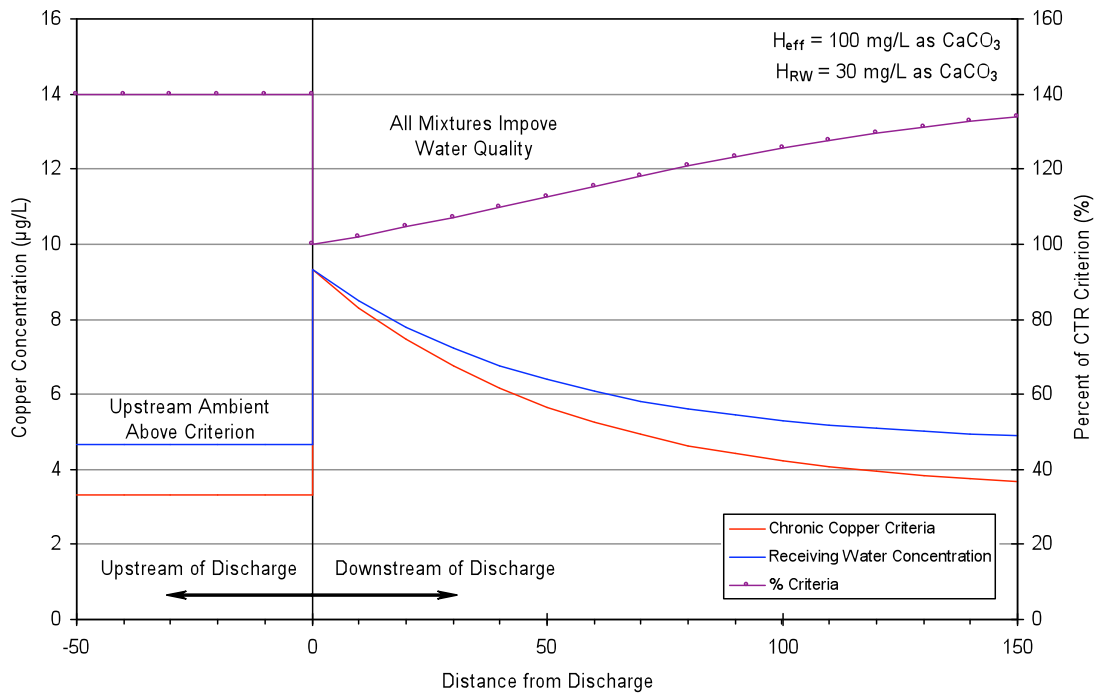
Figure 5: Schematic of Receiving Water with Discharge of Higher Hardness and Metals Criteria for a Concave Down Metal (Copper). Upstream Ambient Above CTR Criterion and Effluent CTR Criteria Calculated with Effluent Hardness Level.
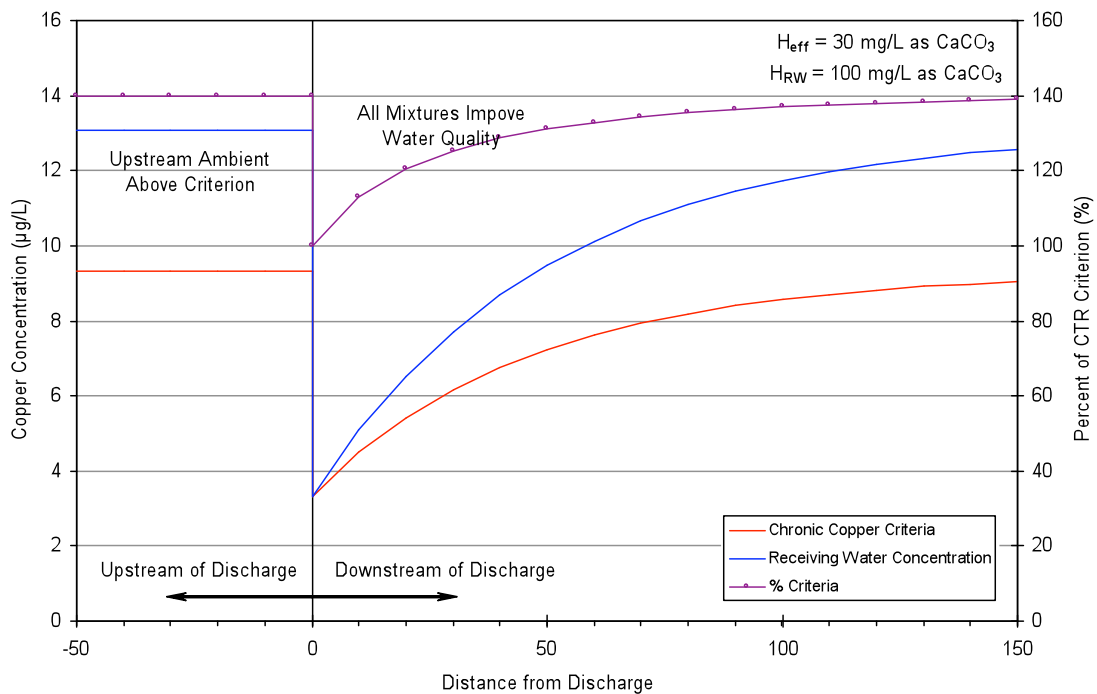

Figure 6: Schematic of Receiving Water with Discharge of Lower Hardness and Metals Criteria for a Concave Down Metal (Copper). Upstream Ambient Above CTR Criterion and Effluent CTR Criteria Calculated with Effluent Hardness Level.

ECA FOR CONCAVE UP METALS

Metals with concave up shaped criteria curves, acute cadmium, lead, and acute silver, require the use of a modified criterion calculation for the effluent to ensure all mixtures of effluent and receiving waters will meet CTR criteria provided the upstream ambient meets CTR criteria. The modified calculation is performed with Equation (1).

$$ECA = \left(\frac{m}{H_{rw}} \left(H_{eff} - H_{rw} \right) + 1 \right) \cdot \exp\left\{ m \cdot \ln\left(H_{rw} \right) + b \right\} \tag{1}$$

Where: m,b = metal specific CTR parameters
H_{eff} = Effluent hardness
H_{rw} = Receiving water hardness

The schematic in Figure 7 corresponds to the case of the ambient concentration equal to the CTR criterion and effluent concentration equal to the value obtained from Equation (1) where the upstream ambient and effluent hardness concentrations are 30 mg/L as $CaCO_3$ and 100 mg/L as $CaCO_3$, respectively. The upstream ambient concentration is at the CTR criterion and the discharge is slightly below the CTR criterion calculated from the effluent hardness. All mixtures of effluent and receiving water result in metals concentrations below the CTR criteria. Equation (1) provides the proper effluent criterion for the case where the effluent hardness is lower than the upstream ambient hardness as illustrated in Figure 8. For the case of upstream ambient at or below the CTR criterion, Equation (1) provides a criterion for the effluent so that any mixture of receiving water and effluent have metal concentrations below the CTR criterion.
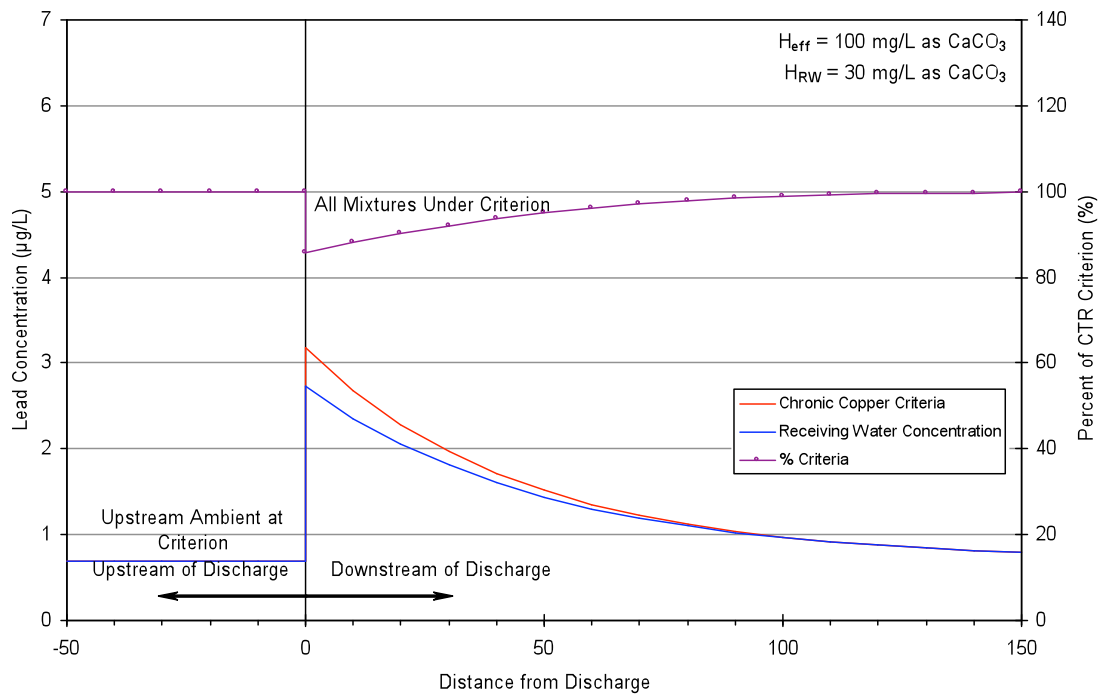

Figure 7: Schematic of Receiving Water with Discharge of Higher Hardness and Metals Criteria for a Concave Up Metal (Lead).
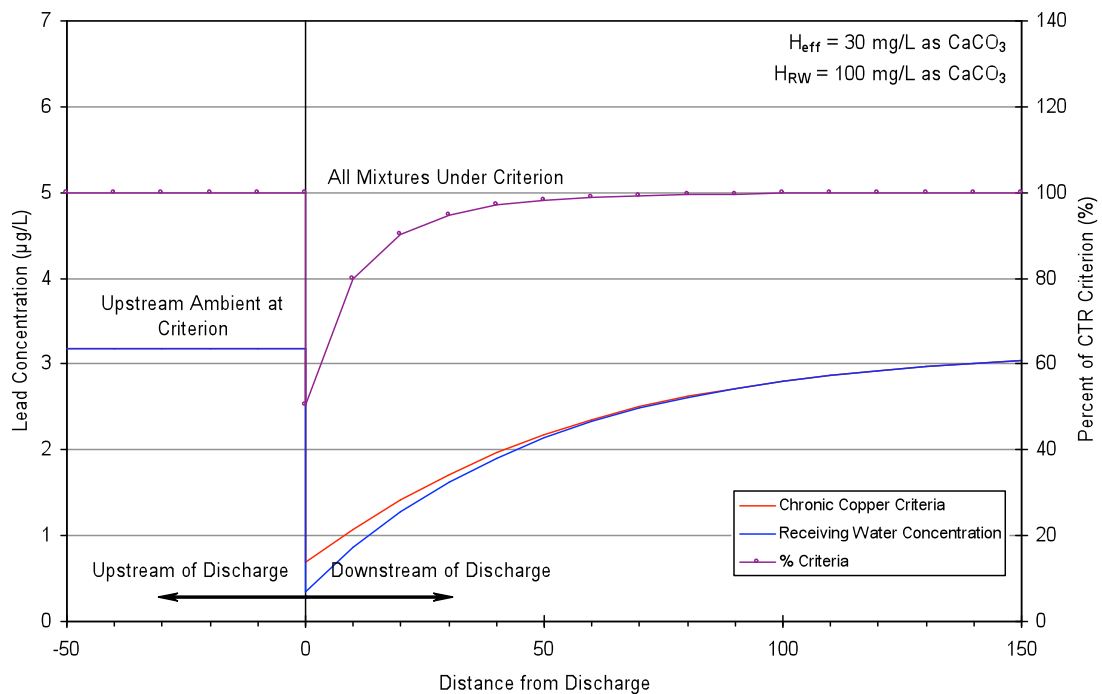
Figure 8: Schematic of Receiving Water with Discharge of Lower Hardness and Metals Criteria for a Concave Up Metal (Lead).

As is the case for concave down metals, if the upstream ambient exceeds the CTR criterion, the downstream mixtures of effluent and receiving water may exceed CTR criterion even when there is no metal in the discharge. However, all mixtures of effluent and receiving water improve the upstream ambient water quality. The effluent does not cause or contribute to an exceedance of the water quality standard.
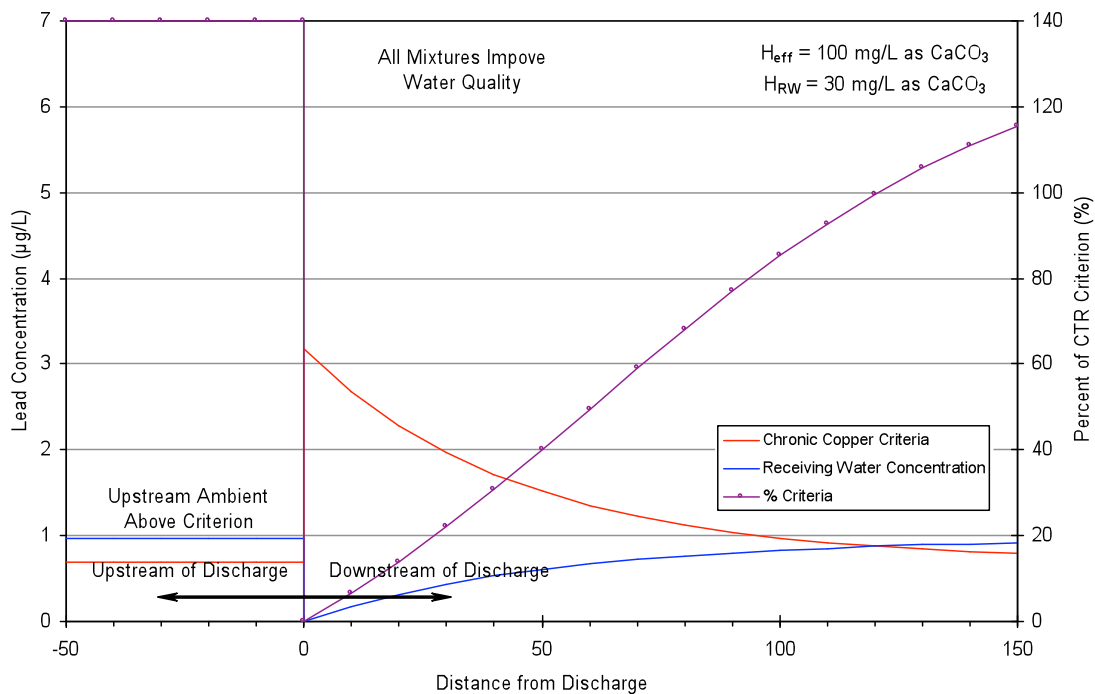
Figure 9: Schematic of Receiving Water with Discharge of Higher Hardness and Metals Criteria for a Concave Up Metal (Lead). Upstream Ambient Above CTR Criterion and Effluent at 0.0 μg/L.

As is true for the concave down metals, specifying the effluent criterion as the CTR criterion calculated with the upstream ambient hardness results in all mixtures of effluent and receiving water with improved water quality from the upstream ambient case, as is illustrated in Figure 10. While depending on the flow ratios, some mixtures of effluent and receiving water may be above the CTR criterion, the water quality is improved over the upstream ambient condition. The effluent does not cause or contribute to an exceedance of the water quality standard.

Calculating the effluent criterion with Equation (1) results in all mixtures of effluent and receiving water with improved water quality compared to the upstream ambient, as is illustrated in Figure 11. While depending on the flow ratios, some mixtures of effluent and receiving water may be above the CTR criterion, the water quality is improved over the upstream ambient condition. The effluent does not cause or contribute to an exceedance of the water quality standard. The result is the same if the upstream hardness is greater than the effluent hardness, as is presented in Figure 12.
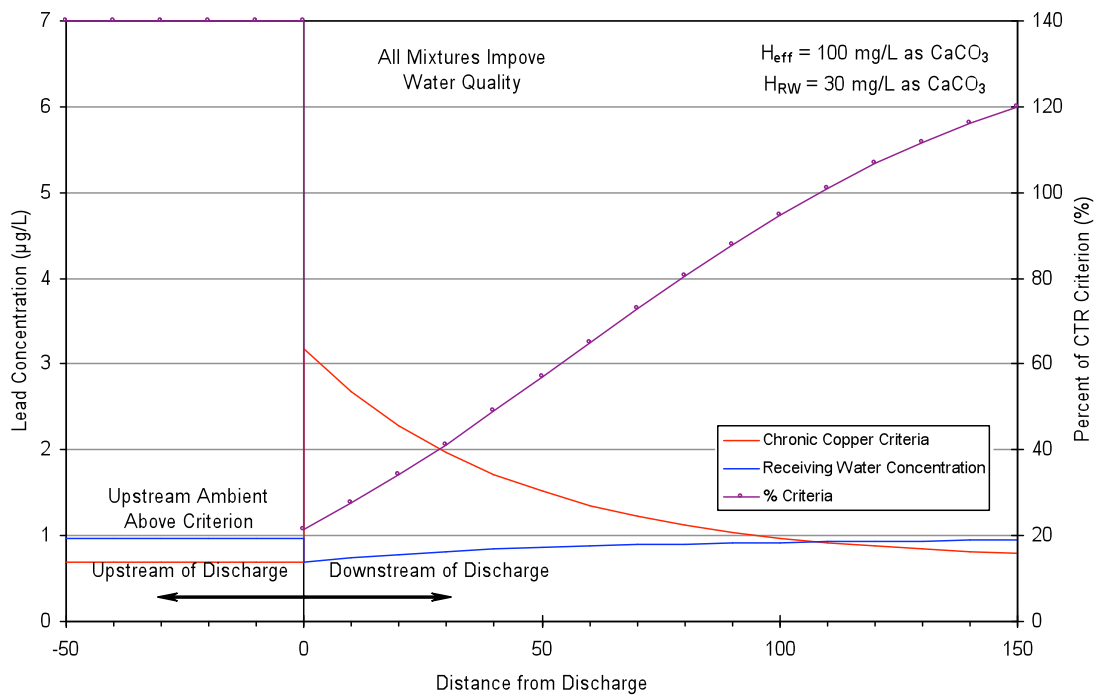
Figure 10: Schematic of Receiving Water with Discharge of Higher Hardness and Metals Criteria for a Concave Up Metal (Lead). Upstream Ambient Above CTR Criterion and Effluent at CTR Criterion Calculated with Upstream Ambient Hardness Level.
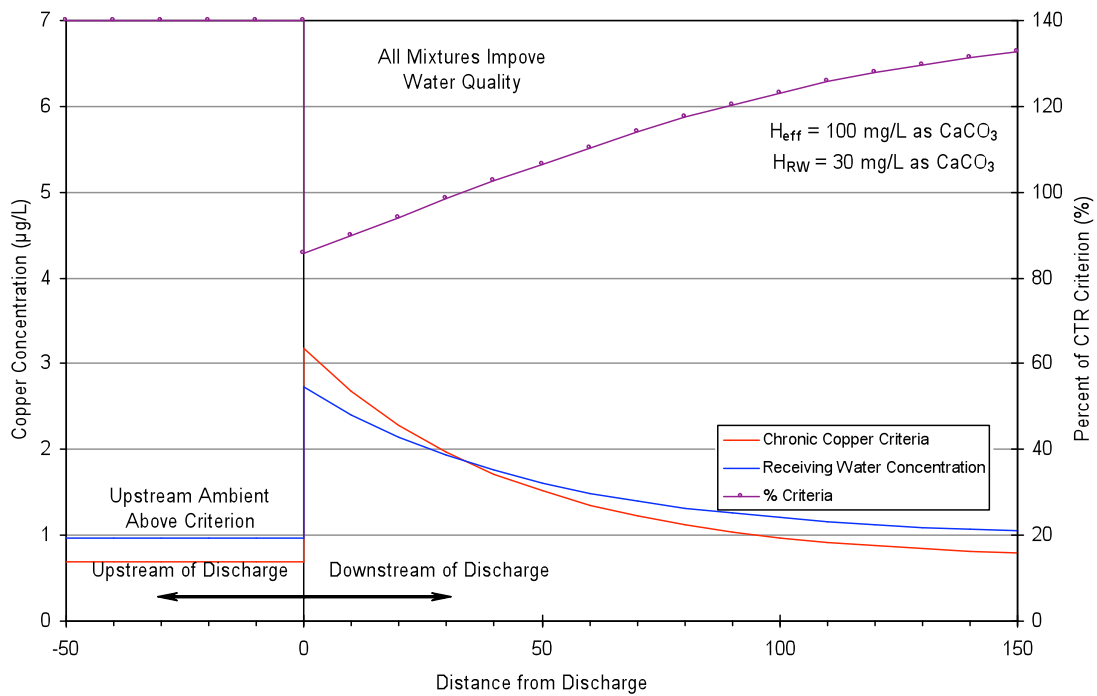

Figure 11: Schematic of Receiving Water with Discharge of Higher Hardness and Metals Criteria for a Concave Up Metal (Lead). Upstream Ambient Above CTR Criterion and Effluent at CTR Criterion Calculated with Equation (1).
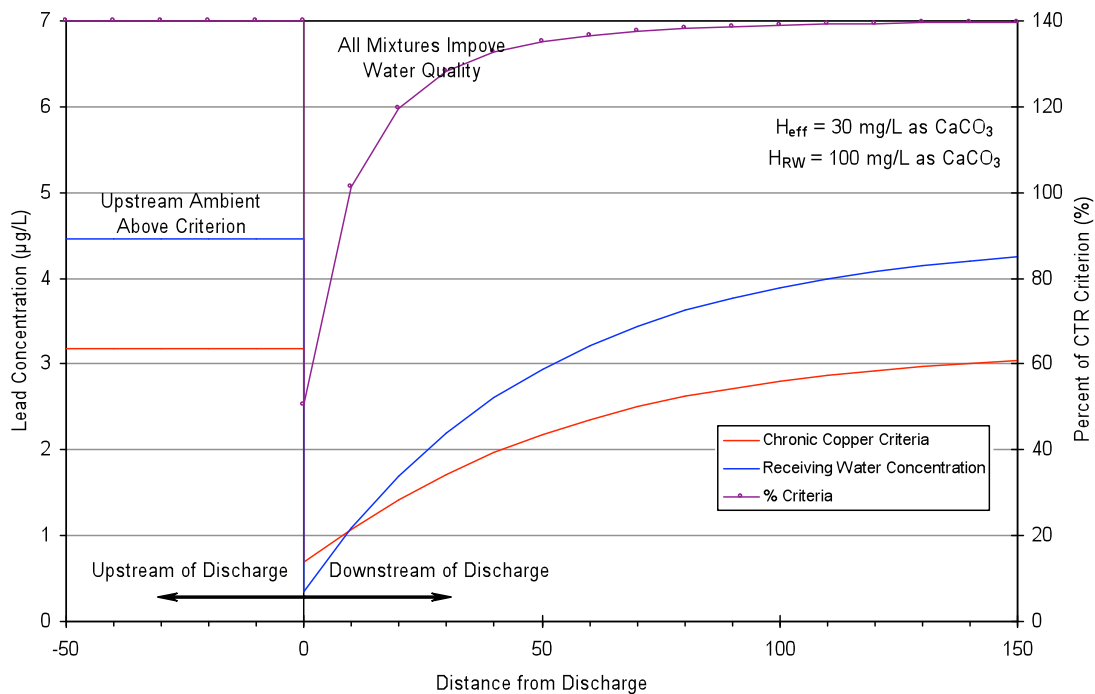
Figure 12: Schematic of Receiving Water with Discharge of Lower Hardness and Metals Criteria for a Concave Up Metal (Lead). Upstream Ambient Above CTR Criterion and Effluent at CTR Criterion Calculated with Equation (1).

CONCLUSION

Using the concave up/concave down method results in criteria that provide the intended level of protection to aquatic life and ensure the discharge will not cause or contribute to exceedances of water quality standards. If the upstream ambient exceeds water quality criteria, the downstream may exceed water quality criteria even when there is no metal in the discharge. The curve method ensures the effluent does not cause or contribute to a water quality standard exceedance whether the upstream hardness is greater or lower than the effluent hardness or whether the upstream ambient is above, at, or below the CTR criterion.

By applying the upstream ambient hardness to effluent concentration allowance (ECA) calculations results in unnecessarily stringent effluent criteria. In calculating the ECA, applying hardness levels less than observed in the effluent for concave down metals or an ECA less than calculated via Equation (1) for concave up metals is effectively using the treatment plant discharge to clean the receiving water. Depending on the flow ratios, if the upstream ambient exceeds the CTR criterion the downstream receiving water may still exceed the criterion even for the case of zero metal in the effluent, regardless of effluent metal concentration. The curve method ensures the effluent criteria are calculated so that the effluent does not cause or contribute to an exceedance of water quality standards.